REMARKS

This Amendment and Response is submitted in reply to the Office Action dated October 4, 2007, in which the following rejections were made:

Claims 1-11 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter;

Claims 1-9 were rejected under 35 USC §103(a) as being obvious over Wilbert Stoecker "Industrial Refrigeration Handbook" in view of Yunus Cengel "Thermodynamics";

Claims 10 and 12-17 were rejected under 35 USC §103(a) as being obvious over Stoecker and Cengel, in view of Seem (U.S. Pat. 6,223,544); and

Claim 11 was rejected under 35 USC §103(a) as being obvious over Stoecker, Cengel, and Seem, in view of Parlos (U.S. Pat. 6,590,362).

Applicants respectfully traverse all rejections below. Claims 1-17 are currently pending. Claims 1 and 12 are independent.

Claims 1-11 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Examiner asserts that the claimed method neither shows a practical application through physical transformation nor produces a useful, concrete and tangible result. Applicants respectfully traverse this rejection.

Following the §101 examination guidelines first published in the Official Gazette Notice of November 22, 2005, and later incorporated into MPEP § 2107, Applicants first note that claims 1-11 fall within an enumerated statutory category; namely, they are directed to a process.

Second, Applicants note that the subject matter of claims 1-11 neither falls within any of the §101 judicial exceptions, nor has the Examiner specified which §101 judicial exception he believes applicable to claims 1-11.

Considering the claimed subject matter, as a whole, Applicants submit that no law of nature dictates measuring variations in the rates of heat flow of heat exchanger fluid flow across a heat exchanger of a system and heat flow of refrigerant fluid flow across a heat exchanger to establish an energy balance that provides for the monitoring of refrigerant flow and identifies the presence of flash gas. Similarly, no natural phenomenon will produce a parameter for monitoring refrigerant flow and detecting the presence of flash gas. Claims 1-11 are not directed to an abstract idea. Rather, claims 1-11 recite variations on a concrete process for deriving a tangible parameter that is useful for detecting flash gas in a vapour-compression refrigeration or heat pump system.

Since Applicants' claimed subject matter falls within an enumerated statutory category and, considered as a whole, does not fall within a judicial exception to the enumerated statutory categories, Applicants respectfully submit that the rejection of claims 1-11 under 35 USC §101 should be withdrawn, and that claims 1-11 should be passed to issue.

Claims 1-9 were rejected under 35 USC §103(a) as being obvious over Wilbert Stoecker "Industrial Refrigeration Handbook" in view of Yunus Cengel "Thermodynamics". A *prima facie* case of obviousness under 35 USC §103(a) is established if the teachings from the prior art itself appear to suggest the claimed subject matter "as a whole" to a person of ordinary skill in the art. Claim 1 recites a method for detecting flash gas in a vapour-compression refrigeration or heat

pump system comprising a compressor, a condenser, an expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant, wherein determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger, and using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived.

Stoecker fails to teach or suggest determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger. Stoecker also fails to teach or suggest establishing an energy balance across a heat exchanger from which a parameter for monitoring the refrigerant flow is derived. Rather, Stoecker discloses forming an energy balance across a flash gas separator to determine the quantity of flash gas removed by the separator.

Although Cengel discloses an energy balance across a heat exchanger in a refrigeration plant, Cengel fails to teach or suggest establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived. Further, Cengel fails to teach or suggest anything regarding flash gas in a refrigeration plant. Thus, Cengel fails to supply the deficiencies of Stoecker with reference to claim 1.

Even if properly combined, the combination of Stoecker and Cengel still fails to teach or suggest all elements recited by claim 1.

Accordingly, Applicants respectfully submit that the rejection of claim 1, as being obvious over Stoecker in view of Cengel, is improper.

Claims 2-9 depend from claim 1 and provide additional recitations thereto. Since the cited references do not teach what claim 1 recites, Applicants respectfully submit that the rejection of claims 2-9, as being obvious over Stoecker in view of Cengel, is improper for at least the reasons stated with reference to claim 1.

Accordingly, Applicants respectfully submit that the rejection of claims 1-9 under 35 USC §103(a) should be withdrawn, and that claims 1-9 should be passed to issue.

Claims 10 and 12-17 were rejected under 35 USC §103(a) as being obvious over Stoecker and Cengel, in view of Seem (U.S. Pat. 6,223,544).

Claim 10 depends from claim 1 and further recites establishing a residual as difference between the first rate of heat flow and the second rate of heat flow. With reference to claim 10, the Examiner is correct to concede that neither Stoecker, Cengel, individually, nor the combination thereof, teaches or suggests "establishing a residual and generating a signal", but is mistaken to assert that Stoecker in view of Cengel "teach most of the limitations of the claim." Neither Stoecker, Cengel, individually, nor the combination thereof, not only does not teach or suggest the recitations of claim 1 (as discussed above), but additionally fails to teach or suggest at least establishing a residual as a difference between two rates of heat flow, as recited by claim 10. While Seem does teach establishing a residual and indicating a problem with the system, Seem does not teach or suggest establishing a residual as a difference between two rates of heat flow. Thus, Seem fails to supply the deficiencies of Stoecker and Cengel with regard to claim 10. Since the cited references do not teach what claim 10 recites, the

rejection of claim 10 as being obvious over Seem in combination with Stoecker and Cengel cannot stand.

Accordingly, Applicants respectfully submit that the rejection of claim 10 under 35 USC §103(a) should be withdrawn, and that claim 10 should be passed to issue.

Claim 12 recites a flash gas detection device for a vapour-compression refrigeration or heat pump system comprising a compressor, a condenser, an expansion device, and an evaporator interconnected by conduits providing a flow path for a refrigerant, wherein the device comprises means for determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger, and using the rates of heat flow for establishing an energy balance from which a parameter for monitoring the refrigerant flow is derived, and means for evaluating the refrigerant mass flow, and generate an output signal. Claims 13-17 depend from claim 12 and provide additional recitations thereto.

Neither Stoecker, Cengel, individually, nor the combination thereof, teaches or suggests means for determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system and a second rate of heat flow of the refrigerant across the heat exchanger. Neither Stoecker, Cengel, individually, nor the combination thereof, also does not teach or suggest means for evaluating the refrigerant mass flow. Seem discloses monitoring air temperatures and the controller output of a finite state machine in order to detect faults. However, Seem teaches away from the present invention by stating that there is no predictable relationship by which to calculate any particular process variable based on the controller output. (column 5, lines 21-31). Additionally,

Seem fails to teach or suggest using the air temperatures to determine refrigerant properties, and Seem further fails to teach or suggest directly measuring any property of the refrigerant. Thus, Seem fails to teach or suggest means for determining a first rate of heat flow of a heat exchange fluid flow across a heat exchanger of the system, means for determining a second rate of heat flow of the refrigerant across the heat exchanger, or means for evaluating the refrigerant mass flow.

Therefore, Seem fails to supply the deficiencies of Stoecker and Cengel with reference to the recitations of claim 12. Since the cited references do not teach or suggest what claim 12 recites, the rejection of claim 12 as being obvious over Stoecker in view of Cengel, in further view of Seem, cannot stand.

Because claims 13-17 depend from claim 12 and provide additional recitations thereto, the rejection of claims 13-17 as being obvious over the combination of Stoecker, Cengel, and Seem cannot stand for at least the reasons stated with reference to claim 12.

Accordingly, Applicants respectfully submit that the rejection of claims 12-17 under 35 USC §103(a) should be withdrawn, and that claims 12-17 should be passed to issue.

Claim 11 was rejected under 35 USC §103(a) as being obvious over Stoecker, Cengel, and Seem, in view of Parlos (U.S. Pat. 6,590,362). Claim 11 depends from claim 10, and further recites providing a fault indicator by means of the residual, the fault indicator being provided according to the formula:

$$S_{\mu_1,i} = \begin{cases} S_{\mu_1,i-1} + s_i, \ when \ S_{\mu_1,i-1} + s_{\mu_1,i} > 0 \\ 0, \ when \ S_{\mu_1,i-1} + s_{\mu_1,i} \leq 0 \end{cases}$$

where $s_{\mu_1,i}$ is calculated according to the following equation:

$$s_{\mu_1,i} = -k_1\left(r_i - \frac{\mu_0 + \mu_1}{2}\right)$$

where

i: index of timewise sensing point;

ri: residual;

k1: proportionality constant;

μ0: first sensibility value; and

μ1: second sensibility value.

The Examiner asserts that one having ordinary skill in the art would find it obvious to use a formula as a fault indicator, and cites Parlos as an example. However, neither Stoecker, Cengel, Seem, individually, nor the combination thereof, teaches or suggests the recitations of claim 10 (as discussed above). Parlos fails to teach or suggest at least establishing a residual as a difference between two rates of heat flow establishing an energy balance across a heat exchanger for detecting flash gas. Thus, Parlos fails to supply the deficiencies of Stoecker, Cengel, and Seem with reference to claim 10. For at least the preceding reason, the Examiner has failed to state a *prima facie* case of obviousness with reference to the recitations of claim 11.

Additionally, neither Stoecker, Cengel, Seem, nor Parlos, individually, nor the combination thereof, teaches or suggests the specific formula recited by claim 11. For this additional reason, the Examiner has failed to state a *prima facie* case of obviousness as to the recitations of claim 11.

Accordingly, Applicants respectfully submit that the rejection of claim 11 under 35 USC §103(a) is improper, that the rejection of claim 11 under 35 USC §103(a) should be withdrawn, and that claim 11 should be passed to issue.

As Applicants have traversed each and every rejection raised by the Examiner, it is respectfully requested that Examiner withdraw the rejections of claims 1-17, and pass claims 1-17 to issue.

Applicants believe that no fees are due in connection with this Amendment and Response. If any fees are deemed necessary, please charge them to deposit account 13-0235.

Respectfully submitted,

By /Marina F. Cunningham/
Marina F. Cunningham
Registration No. 38,419
Attorney for Applicants

Customer No.: 35301
McCORMICK, PAULDING & HUBER LLP
CityPlace II
185 Asylum Street
Hartford, CT 06103-3402
(860) 549-5290